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Four hundred and sixty-fourth meeting.

April 12, 1859. — MONTHLY MEETING.

The Academy met at the house of Dr. J. M. Warren.

The PRESIDENT in the chair.

Professor Peirce reported favorably on Mr. Safford's paper, which had been referred to him at the last monthly meeting, recommending its reference to the Committee of Publication. The report was accepted, and the recommendation adopted.

Dr. Warren exhibited a specimen of *Cheironectes*, and explained some of its peculiarities of structure and habits.

Dr. Warren also exhibited a suite of specimens of crania and casts of crania of the different species of Ourang, including the great *Troglodytes Gorilla* of Western Africa, together with stuffed specimens of the Chimpanzee: he pointed out the characteristic features of the different species, and exhibited lithographic illustrations of the gigantic Gorilla now in Paris. He also exhibited specimens illustrating the progress of the new art of photolithography.

Professor Peirce gave the following abstract of a memoir on the personal peculiarities of astronomical observers.

"The first portion of this memoir considered the changes which occur in the personal equations of observers. The materials for this inquiry were derived from that vast reservoir of astronomical investigation, the 'Greenwich Observations,' since it has been under the able administration of Professor Airy. The mode of determining the personal equation adopted at this observatory, from the regular observations, and not from especial observations instituted for this purpose, is the only one which is safe and trustworthy. From these observations, it appears that observers differ greatly from each other in the continuity and regularity of their habits. There are those who retain for many years, as nearly as it can be ascertained, an invariable personal equation. Others change uniformly and regularly. Others seem to vary by a uniformly increasing or decreasing rate of change; while others, on the contrary, are subject to sudden and abrupt variations, in which there is no evidence of law. Examples were given of all these various peculiarities.

"In the second portion of the memoir, the mental time-scales by which different observers subdivide the second were subjected to analysis, and the extraordinary gain to science which has accrued from the American method of observation was carefully discussed. The time-scale of each observer was inferred from the relative number of times which each tenth of a second occurred in his observations. It was shown that the habits of the observer were invariable in this respect, and were not subject to change with time or circumstance. It was also shown that the reference of this peculiarity to the inequality of the time-scale was the only just and consistent theory. It appears that, although some of the oldest and most experienced observers, such as Henry and Main of the Greenwich Observatory, are peculiarly prone to excessively defective time-scales, from which the younger observers, such as Ellis, Dunkin, and Rogerson of Greenwich, and Keith and Almy of Washington, are comparatively free, yet the veteran Argelander manifests, in this respect, the great superiority of his training. But with the American method the irregularity of time-scale vanishes, and in this first step with which America has commenced its astronomical career, we must, when we examine it historically and critically, claim to recognize the future promise of the country in this science, when the field shall be fairly opened. The American method is the unquestionable product of the Coast Survey of the United States, and was the legitimate result of the rigid and profound methods of research which are uniformly adopted in this magnificent work. The first conception was in the mind of the Superintendent himself, Professor Bache, and its complete development and ultimate success were owing to the united action of Professor Bache and his friend and assistant, Mr. Sears C. Walker. The details of the instrumental invention and execution were intrusted to Messrs. Saxton, Bond, Mitchel, and Locke. Different plans were proposed, but that of Mr. Bond is the one which is at present adopted in the Coast Survey, although some of the others possess peculiar advantages, which deserve further examination and experiment. The ingenious apparatus which has been adopted by Professor Airy, at Greenwich, differs radically from either of the American forms, although this distinguished astronomer candidly admits the American origin of the method, and states distinctly that 'the practical introduction of galvanic chronographic apparatus, in a form available for the purposes of an observatory, is entirely due (so far as I am aware) to American astronomers.' The injurious effect of introducing the make-circuit signal instead of the break-circuit signal, which latter has been rigidly insisted upon by Dr. Gould, is quite manifest in the Greenwich record. There are other difficulties, however, of a more recondite nature, which deserve thorough examination, as well as those of the other methods, none of which have received the proper investigation from the different inventors, although they cannot fail to be detected or explored by the severe criticism of the Coast Survey. This research would be materially accelerated, if our observatories would devote a due proportion of labor to the use and investigation of the established and received methods of observation with which they are so generously endowed and so magnificently equipped, instead of employing the great mass of their time in the invention of new processes, and should recall the fundamental principle of their existence,— *that science, and not art, is the final end of an astronomical observatory.*"

Dr. C. T. Jackson exhibited specimens of vegetable wax from Japan, together with specimens of the fruit of the plant from which it was obtained, a species of Rhus (*R. succedaneum*, L.). He also showed a fragment of a Trilobite in calcareous slate from St. Mary's Bay, Newfoundland, probably a Paradoxides.

Mr. H. J. Clark made the following remarks : —

" A few months ago a French physiologist, Pouchet, revived the long-exploded doctrine of equivocal or spontaneous generation, and asserted that he had been able to obtain certain living beings from substances which were entirely shut off from the outer world, and in which, after having undergone certain preparations, there could not possibly be any germs of these animals. A discovery, which I made on the 20th of March, may not be uninteresting, as it has more or less relation in its nature to the theory so earnestly advocated by Pouchet. There are certain well-known bodies described as animals by Ehrenberg, under the name of Vibrio; their peculiarity consists in that they are composed of a single row of globular bodies, resembling a string of beads, more or less curved, and move in a spiral path with great velocity, even faster than the eye can follow in many cases. They exhibit, by their activity, more plausible signs of animality than any of the Desmideæ or Diatomaceæ, and fully as convincing indications of life as the spores of Algæ, to which they were first referred by the late lamented Dr. W. J. Burnet, and after him by Rudolph Wagner and Leuckart. They have always been spoken of as developing around decaying animal and vegetable matter. I was very much surprised to discover the manner in which they originate from such substances. I was studying the decomposing muscle of a Sagitta, a little crustacean, as I consider it, — which, in passing, I would observe was found by me a year ago last March, for the first time in this country, at Lynn Harbor, — when I noticed large numbers of Vibrio darting hither and thither, but most frequently swarming about the muscular fibres. I was struck with the similarity of these bead-like strings to the fibrillæ of the muscle, and upon close comparison I found that the former were exactly of the same size, and had the same optical properties as the latter. Some of these appeared to be attached to the ends of the flat, ribbon-like fibres, and others at times loosened themselves and swam away. I was immediately impressed with the daring thought, that these Vibrios were the fibrillæ set loose from the fibres; but as this was a thing unheard of, and so startling, I for the time persuaded myself that they must have been accidentally attached and subsequently loosened. However, I continued my observations until I found some fibres in which the fibrillæ were in all stages of decomposition. At one end of the fibre the ultimate cellules of the fibrillæ were so closely united, that only the longitudinal and transverse striæ were visible; further along, the cellules were singly visible, and still further they had assumed a globular shape; next, the transverse rows were loosened from each other excepting at one end; and finally, those at the extreme of the fibre were agitated and waved to and fro as if to get loose, which they did from time to time, and, assuming a curved form, revolved each upon its axis and swam away with amazing velocity. There was no doubting, after this, the identity of the Vibrios and the muscular fibrillæ; but I thought such a strange phenomenon ought to have a second witness to vouch for it, and therefore went for the best that could be wished for, Professor Agassiz. I simply placed the preparations before him, and, without giving him the least hint of the origin of the muscle, I was pleased to have him rediscover what I had seen but fifteen minutes before. The number of ultimate cellules in a moving string varied from two to fifty; the greatest number of strings were composed of only three or four, often six to eight, and rarely as high as fifty. Very rarely the fibres split longitudinally, and in such instances the fibrillæ were most frequently long, and moved about with undulations rather than a wriggling motion. A single ultimate cellule, when set loose, danced about in a zigzag manner; but whenever two were combined, the motion had a definite direction, which corresponded to the longer diameter of the duplicate combination; and if only three were combined, the spiral motion was the result of their united action. What it is that causes these cellules to move, I do not profess to know, but certainly it is not because they possess life as independent beings. This much is settled, however, that we may have presented to us all the phenomena of life, as exhibited by the *activity* of the lowest forms of animals and plants, by the ultimate cellules of the decomposed and fetid striated muscle of a Sagitta. I do not pretend to say that everything that comes under the name of Vibrio or Spirillum is a decomposed muscle or other tissue, although I believe such will turn out to be the fact; but this much I will vouch for, and will call on Professor Agassiz to witness, that what would be declared, by competent authority, to be a living being, and accounted a certain species of Vibrio, is nothing but absolutely dead muscle."

Professor Agassiz corroborated Mr. Clark's statements most fully, and spoke of the discovery as one of the very greatest interest and importance.

Dr. A. A. Gould, in reference to the discussion on the distribution of plants and animals, made some statements, illustrating the power of external agencies, with reference to the shells of Japan. Out of nearly nine hundred shells from these islands which he had examined, only seventeen had been found both on the island of Niphon and on Jesso, which are separated by a passage of only some forty miles in width. The fact is accounted for by the existence of a strong marine current from the north and west, which passes through the strait.

Dr. Asa Gray communicated two papers, as follows: —

I. Characters of *Ancistrophora*, a new Genus of the Order

Compositæ, detected by Mr. Charles Wright in the Eastern Part of Cuba.

II. On the Genus *Croomia*, and its place in the Natural System.

Four hundred and sixty-fifth meeting.

April 26, 1859. — SUPPLEMENTARY MEETING.

In the absence of the President and Vice-President, the Corresponding Secretary took the chair.

The Corresponding Secretary read a letter from the Asiatic Society, dated Calcutta, December 10, 1858, acknowledging the receipt of the Academy's publications.

Professor Peirce gave the following analysis of his memoir upon the Tail of Donati's Comet.

"1. The theory proposed by Bessel, in Vol. XIII. of the *Astronomische Nachrichten*, is adopted as the basis of the theory, and it is proposed to determine the special values of the repulsive force from the sun, and of the initial impulse given by the comet, which are most reconcilable to the observed phenomena. In the first approximation, the initial impulse was neglected, because it was assumed to be quite small.

"2. Rigorous formulæ are adopted in place of the approximations given by Bessel, which are only available at a short distance from the head of the comet, whereas the critical portions of the investigation are those which apply to the part of the tail which is most remote from the head. The approximate formulæ were employed by Pape in his researches upon Donati's comet, which is astronomically designated as 1858 V.

"3. The observations of the tail which have served as the basis to this investigation are those given by Pape in the *Astronomische Nachrichten*, and an admirable series made at the Dudley Observatory, by Mr. Searle and Mr. Toomer, under the judicious direction of Dr. Gould.

"4. The observations of the front edge of the Donati comet are very well satisfied by a solar repulsive force $= -1\frac{1}{2}$, if gravity is adopted as the unit of force. The comparison of theory with observa-